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Applicant: KABUSHIKI KAISHA TOPCON,

Itabashi-ku (JP)

Hiroaki Okada, Saitama (JP); Taisaku (72)Inventors:

> Kogawa, Mitaka (JP); Takashi Fujimura, Fujimino (JP); Kohta Fujii,

Toda (JP)

Assignee: KABUSHIKI KAISHA TOPCON,

Itabashi-ku (JP)

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See application file for complete search history.

(56)References Cited

U.S. PATENT DOCUMENTS

2004/0156019 A1 8/2004 Masaki 2007/0299429 A1 12/2007 Amano (Continued)

FOREIGN PATENT DOCUMENTS

2 281 500 A1 EP 2/2011 JP 05 56927 3/1993

(Continued)

OTHER PUBLICATIONS

International Search Report Issued Jan. 14, 2014 in PCT/JP2013/ 082645 filed Dec. 4, 2013.

(Continued)

Primary Examiner — Stephone B Allen Assistant Examiner — Brandi Thomas (74) Attorney, Agent, or Firm — Oblon, McClelland, Maier & Neustadt, L.L.P.

(57)ABSTRACT

An ophthalmologic apparatus includes an examination optical system, drive part, two or more imaging parts, analyzer, storage, position corrector, and controller. The examination optical system examines an eye. The drive part moves the examination optical system. The imaging parts substantially simultaneously photograph the anterior segment of the eye from different directions. The analyzer analyzes two or more photographic images captured substantially simultaneously by the imaging parts to obtain a three-dimensional position of the eye. The storage stores correction information in advance. The correction information is acquired based on optical properties of eyeballs, and used to correct the position of the eye in the optical axis direction of the examination optical system. The position corrector corrects the three-dimensional position obtained by the analyzer based on the correction information. The controller controls the drive part based on the three-dimensional position corrected to move the examination optical system.

12 Claims, 10 Drawing Sheets

